As discussed in the following methods section, the oil spill volumes considered varied over several orders of magnitude. Facility spills were generally smaller than spills from vessel hazard areas. In fact, many of the facility spill volumes were much less than the available daily cleanup capacity for the facility. For these facilities, it is likely, however, that spill response and cleanup would occur within 1 day. Nonetheless, for the purposes of calculating a spill envelope, it was conservatively assumed that the facility spills would not be contained until 3 days after the initial release. It was assumed that vessel spills, which are generally larger and farther removed from cleanup equipment, would require more than local resources for response and cleanup. For these spills, a 3-day period before containment was also assumed.

202.2 Methods

Transport of spilled oil was based on two factors: 1) environmental effects and 2) properties of crude oil. The environmental transport mechanisms included wind stress, tidal advection and dispersion, large-scale oceanic currents, and riverine effects. Not all these transport mechanisms applied to each spill site. Other effects that contributed to transport from the spill site or spill volume reduction included evaporation and spreading due to gravity and surface tension.

To simplify the analysis, a generic California crude oil was selected as a target spill hazard because it is the most persistent petroleum substance that is likely to be spilled. As previously mentioned, spill envelopes were developed for all facility and vessel hazards for 3 days.

Calculation of the spreading of a spill was based on the work of Fay (1971). The calculations for spreading included the effects of gravity, inertia, viscous forces, surface tension, evaporation, and dispersion. For simplicity, it was assumed that the spill always spread radially. The model does not account for recovery, stranding, dispersion in high energy waves, or other removal. Nor does the envelope generated represent the amount of oil stranded or contaminating any area within the envelope.

Some second-order mechanisms that affect oil transport and persistence in the marine environment were considered. The spreading calculations considered how loss and degradation processes limit the physical spreading of the spill. The thickness of the oil was factored into the analysis as a function of initial spill volumes. Generally, the slick was no longer considered once it was not visible from the air. For most analyses, the final oil thickness was approximately 0.1 millimeter (mm) and never less than 0.01 mm (Figure 202-1).